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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JAMES TIMOTHY CRONIN, THOMAS SHIELDS ELKINS,
LISA EDITH HELBERG, STEVE EDWARD MIRABELLA,
and JAMES ELLIOTT MERKLE

Appeal 2009-004479
Application 10/539,718
Technology Center 1700

Decided: August 04, 2009

Before PETER F. KRATZ, MICHAEL P. COLAIANNI, and
JEFFREY B. ROBERTSON, *Administrative Patent Judges*.

KRATZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 12-19. We have jurisdiction pursuant to 35 U.S.C. § 6.

Appellants' claimed invention is directed to a process for purifying

crude chlorinator discharge comprising titanium tetrachloride, aluminum chloride and vanadium chlorides using a vanadium passivating agent to form passivated discharge comprising more easily separable vanadium compounds. The passivation is followed by a titanium oxychloride detection step applied to the passivated discharge and, optionally, an aluminum passivating agent mixing step when no oxychloride of titanium is detected in the discharge. The detection of the absence of titanium oxychloride in the passivated discharge represents a marker for the presence of non-passivated aluminum chloride remaining in the passivated titanium tetrachloride-containing discharge, which signals the need for aluminum oxide passivating agent addition. Separation of vanadium compounds and aluminum compounds that are easy to separate follows.

Claim 12 is illustrative and reproduced below:

12. In an improved process for purifying a crude titanium tetrachloride chlorinator discharge from the carbochlorination of titanium-containing materials comprising titanium tetrachloride, aluminum chloride and vanadium chlorides, by mixing a vanadium passivating agent selected from the group consisting of organic oil into the chlorinator discharge to form a passivated discharge comprising one or more easy-to-separate vanadium-containing compounds, wherein the improvement comprises:

(a) detecting, in the passivated discharge, titanium oxychloride formed therein, and, if titanium oxychloride is absent, mixing an aluminum passivating agent into the passivated discharge in an amount sufficient to passivate the aluminum chloride and react with the titanium tetrachloride to form titanium oxychloride, the aluminum passivating agent being selected from the group consisting of water, water containing solutions, water containing mixtures, and carboxylic acid to form one or more easy-to-separate aluminum-containing compounds in the passivated discharge; and

(c) separating from the passivated discharge the easy-to-separate vanadium- and aluminum-containing compounds to form a purified titanium tetrachloride.

In addition to admitted prior art, the Examiner relies on the following prior art references as evidence in rejecting the appealed claims:

Frey	2,592,021	April 8, 1952
Kay	2,600,881	June 17, 1952
Cronin	2001/0016182	Aug. 23, 2001
National Lead Company	GB 744,074	Feb. 01, 1956

The following additional evidence is supplied by Appellants:

Robinson	4,246,022	Jan. 20, 1981
Wigginton	AU 219,385	Mar. 27, 1958

Claims 12-19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the admitted prior art (preamble of Jepson-type claim 12) or GB 744,074 (hereafter “GB ‘074”), each in view of Cronin. Claims 12-19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kay in view of Frey and Cronin.

We affirm the stated rejection for substantially the reasons set forth by the Examiner in the Answer. We offer the following for emphasis.

Appellants argue claims 12, 13, and 15-18 together as a group with respect to each of the Examiner’s rejections. Accordingly, we select claim 12 as the representative claim for the aforementioned claim group. We consider claims 14 and 19 separately to the extent separately argued.

Based on the combined teachings of the admitted prior art or GB ‘074 taken with Cronin, the Examiner has determined that it would have been

obvious to one of ordinary skill in the art to employ the vanadium chloride passivation of the admitted prior art or GB '074 together with the aluminum chloride passivation and titanium oxychloride detection of Cronin in treating discharge from a titanium tetrachloride chlorinator to obtain the expected passivation of both aluminum chloride and vanadium chloride found in the discharge while reducing titanium losses due to a possible over-addition of aluminum chloride passivating agent (Ans. 8).

Based on the combined teachings of Kay, Frey and Cronin, the Examiner has similarly taken the position that the claimed subject matter would have been obvious to an ordinarily skilled artisan given that the technique for passivating vanadium chloride and the technique of using titanium oxychloride detection when removing aluminum chloride impurities from titanium tetrachloride chlorinator discharge with an aluminum chloride passivation agent, as claimed, were individually taught by the prior art; and, hence the combination thereof would have been suggested by the collective teachings of the applied prior art (Ans. 10-11).

Appellants, on the other hand, maintain that the Examiner's proposed combination of references in each of the stated rejections falls short in rendering the subject matter of claim 12 *prima facie* obvious, within the meaning of 35 U.S.C. § 103(a) (*see generally* App. Br. and Reply Br.). In this regard, Appellants essentially argue that neither assemblage of applied prior art, as furnished by the Examiner in the separately stated rejections, would have suggested, to one of ordinary skill in the art, applying a titanium oxychloride detection step to a vanadium passivated discharge from a titanium tetrachloride chlorinator (with an aluminum chloride passivation step following when no titanium oxychloride is detected). Appellants urge

this is so because the separately applied prior art combinations do not teach or suggest that such a detection step (and possible follow up aluminum chloride passivation step) would be applicable to a vanadium passivated discharge stream of a titanium tetrachloride chlorinator (App. Br. 12-17; Reply Br. 5-7).

PRINCIPAL ISSUES

Have Appellants identified reversible error in the Examiner's obviousness rejections by asserting that the step of detection of titanium oxychloride in a vanadium chloride passivated discharge from a titanium tetrachloride chlorinator (with aluminum chloride passivation agent added when titanium oxychloride is not detected) is not taught or suggested to one of ordinary skill in the art by:

- (1) the combined teachings of the admitted prior art or GB '074 taken with Cronin and/or
- (2) the combined teachings of Kay, Frey, and Cronin?

PRINCIPLES OF LAW

Section 103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103).

“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 415-16. The question to be asked is “whether the improvement is more than the predictable use of prior art elements according to their established functions.” *Id.* at 417.

The test for obviousness is what the *combined* teachings of the references would have suggested to those of ordinary skill in the art. *In re Young*, 927 F.2d 588, 591 (Fed. Cir. 1991). *See also, DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006) (“The motivation need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself.”).

It is axiomatic that admitted prior art in an Applicants' Specification may be used in determining the patentability of a claimed invention and that consideration of the prior art cited by the Examiner may include consideration of the admitted prior art found in an Applicants' Specification. *In re Nomiya*, 509 F.2d 566, 570-571 (CCPA 1975); *In re Davis*, 305 F.2d 501, 503 (CCPA 1962); *In re Hedges*, 783 F.2d 1038, 1039-1040 (Fed. Cir. 1986).

The preamble of a Jepson-type claim is impliedly admitted to be known in the prior art. *See In re Fout*, 675 F.2d 297, 301 (CCPA 1982); *In re Ehrreich*, 590 F.2d 902, 909-910 (CCPA 1979).

FINDINGS OF FACT

In addition to, or for emphasis of, findings of fact set forth elsewhere in this opinion and as the Examiner additionally presents in the Answer, the following findings of fact are noted.

As the Examiner has found, Appellants admit that a process of purifying a titanium tetrachloride chlorinator discharge, which discharge includes aluminum chloride and vanadium chlorides, is known wherein a vanadium chloride passivating agent, such as organic oil, is used to form a passivated discharge steam including more easily separable vanadium-containing compounds (Ans. 5-6; preamble of Jepson-type claim 12). Appellants do not dispute this determination of the Examiner (*see generally* App. Br. and Reply Br.).

The Examiner has determined without specific dispute that GB '074 discloses a process of purifying a titanium tetrachloride chlorinator discharge, which discharge includes aluminum chloride and vanadium chloride, using a vanadium chloride passivating agent, such as animal wax, to form a passivated discharge steam including more easily separable vanadium compounds therein (Ans. 5-6; GB '074, p. 1, ll. 20-61 and p. 2, ll. 21-71; *see generally* App. Br. and Reply Br.).

Also, the Examiner has essentially found that Cronin teaches or suggests adding aluminum chloride passivation agent to discharge from a titanium tetrachloride chlorinator to address unwanted active aluminum chloride impurities (App. Br. 6-7; Cronin, ¶¶ 0002, 0014, 0024-0026). As determined by the Examiner, Cronin discloses or suggests detecting/monitoring the titanium oxychloride concentration in the discharge before or after aluminum chloride passivation agent addition as an indirect

way of indicating the presence of unwanted aluminum chloride in the chlorinator discharge and for controlling the rate of addition of aluminum chloride passivation agent to the chlorinator discharge (Ans. 6-7; Cronin, ¶¶ 0009, 0019-0022, 0027-0028, 0030-0032, 0034-0036, and 0039).

Appellants do not specifically refute the Examiner's aforementioned determinations as to the teachings of Cronin (*see generally* App. Br. and Reply Br).

With respect to the Examiner's second stated rejection and in addition to the findings of fact with respect to Cronin set forth above, the Examiner has found that Kay teaches or suggests removing vanadium chlorides (color impurities) from a titanium tetrachloride stream after having previously treated the titanium tetrachloride steam for aluminum chloride removal (Ans. 9; *see* Kay, col. 2, l. 15-col. 3, l. 79, col. 4, ll. 26-41, col. 5, ll. 31-36, col. 6, l. 9- col. 7, l. 11).

In addition, the Examiner has found that Frey discloses removing color impurities from titanium tetrachloride by treating with organic materials, such as hydrocarbons, and other carbon-containing compounds together with heat followed by separation (Ans. 9-10; *see* Frey, col. 1, ll. 11-31, col. 3, ll. 21-37, and Exs. 1, and 3-5). Appellants do not specifically dispute the factual findings of the Examiner with respect to the teachings of Kay and/or Frey (*see generally* App. Br. and Reply Br).

Appellants acknowledge that "[c]ommon metal chloride impurities present in the crude titanium tetrachloride include chlorides and complex chlorides of aluminum, niobium, tantalum, and vanadium" and that "aluminum chloride must be rendered non-corrosive via treatment with a passivating agent" (Spec. 1).

Appellants acknowledge that “[w]ater, sodium chloride, sodium hydroxide or a mixture of these are the most common agents added to passivate aluminum chloride,” which passivated aluminum chloride is easy to separate from crude titanium tetrachloride (Spec. 1-2).

Appellants acknowledge that:

Vanadium chlorides form colored species that must be removed if the titanium tetrachloride is to be used for production of titanium dioxide pigment. Typically, treatment agents are added to the crude titanium tetrachloride to chemically modify these vanadium compounds so that they may be removed.

Spec. 2.

The Examiner has found that Robinson, cited by Appellants (App. Br. 10 and Evidence Appx.), teaches or suggests that aluminum chloride impurity can be removed together with vanadium chloride from a titanium tetrachloride stream by treating the titanium tetrachloride stream with mineral oil (Ans. 11-12; Robinson, col. 1, ll. 38-43).

ANALYSIS

Regarding the Examiner’s first stated obviousness rejection and representative claim 12, Appellants basically acknowledge that the use of animal wax or organic oil to remove (passivate) unwanted vanadium from a crude titanium tetrachloride discharge stream was known, but argue that the use of animal wax or organic oil for removing non-desirable aluminum was not known. However, this argument is not persuasive because it is not supported by the facts of record. For example and as determined by the Examiner (Ans. 11-12), the prior art of record reflects that one of ordinary

skill in the art would have been informed that treating titanium tetrachloride discharge with a vanadium passivation agent, such as oil, would have resulted in removal of some aluminum chloride in addition to the passivated vanadium chlorides, as taught by Robinson (Ans. 11-12; Robinson, col. 1, ll. 38-43; App. Br. 10, Evidence Appx.).¹ Consequently, the aforementioned argument by Appellants is undercut by the factual record before us. Moreover, Appellants' urgings that one of ordinary skill in the art would have had no basis for applying a detection step for determining if titanium oxychloride is present in such a vanadium passivated titanium chloride discharge stream and using such as an indicator for assessing the need for adding aluminum passivating agent, as claimed, is likewise unavailing. This is because the latter argument is predicated, in part, on Appellants' assertion that one of ordinary skill in the art would not have known that aluminum was removed from a vanadium passivated (oil treated) titanium tetrachloride discharge stream, which argument we found to be contrary to, rather than substantiated by, the evidence before us.

Additionally and as found by the Examiner, Cronin provides further evidence that supports the Examiner's obviousness assessment. Cronin teaches or suggests that a titanium oxychloride detection step for assessing the active aluminum chloride presence in a titanium tetrachloride discharge stream and for assessing the need for aluminum passivation agent addition, can be performed on a crude discharge stream before or after aluminum passivation (Cronin, ¶¶ 0011 and 0034; Ans. 7, 8, and 12-14). Furthermore, we agree with the Examiner's observation that representative claim 12 does not exclude the addition of an aluminum passivation agent to the titanium

¹ See *Hedges*, 783 F.2d at 1039-40.

chloride discharge stream prior to the titanium oxychloride detection step (Ans. 8, 12, and 14).

As for Appellants' assertion suggesting that vanadium passivated titanium tetrachloride streams would contain solids that render these streams inhospitable to a titanium oxychloride detection step (App. Br. 11 and 13), we agree with the Examiner that this argument is not substantiated with persuasive evidence and runs contrary to the teachings of Cronin (Ans. 14; Cronin, ¶ 0034). Indeed, as the Examiner points out, Cronin teaches that particulate filtering and/or screening can be employed prior to titanium oxychloride detection (Ans. 14; Cronin, ¶ 0034).

Concerning separately argued claim 14 and notwithstanding the arguments there against (App. Br. 14), we agree with the Examiner that one of ordinary skill in the art would have recognized from the teachings of the applied references (*see, e.g.*, GB '074, p. 2, ll. 109-112) that adding an amount of vanadium passivating agent that would only be enough to obtain the desired vanadium removal ("substantially complete" removal) and product purity sought is an available option for economy reasons (Ans. 15). Thus, the teachings of GB '074 would have been reasonably suggestive of additive amounts that reduce vanadium concentration but without completely eliminating it (*id.*). Also and notwithstanding Appellants' argument to the contrary (App. Br. 15), we agree with the Examiner that the use of a multi-step passivation agent addition, such as a two-step vanadium passivation agent addition as required by claim 19, would have been within the skill level of, and a recognizable option to, one of ordinary skill in the art for obtaining the expected cumulative effect of such repeated steps given the evidence of record for and against such a conclusion (Ans. 15-16). After all,

one of ordinary skill in the art is presumed to have skills apart from what the prior art references expressly disclose. See *In re Sovish*, 769 F.2d 738, 742-43 (Fed. Cir. 1985).

Turning to the Examiner's second stated obviousness rejection, we note that to the extent Appellants' arguments parallel those made against the first stated rejection, which they do for the most part with respect to the teachings of Cronin and the admitted prior art of record², such arguments are not persuasive for substantially the reasons set forth above and in the Examiner's Answer. As for Appellants' arguments pertaining to Kay teaching distillation to remove vanadium impurities following aluminum chloride removal, we agree with the Examiner that the combined references' teachings, including Frey together with Kay, would have reasonably suggested adding organic oil, as a vanadium passivating agent, as an alternative to the vanadium impurity removal technique of Kay for addressing unwanted vanadium compounds (Ans. 9, 10, 16; Frey, col. 2, ll. 5-17).

To the extent that Appellants maintain that Kay would have suggested an order of adding agents that address unwanted aluminum and vanadium impurities that is contrary to that claimed (App. Br. 16), we again note that representative claim 12 (and the dependent claims) do not preclude aluminum passivation agent addition prior to or with vanadium passivation agent addition. Moreover, one of ordinary skill in the art informed by the

² It is axiomatic that admitted prior art may be used in determining the patentability of a claimed invention and that consideration of the prior art cited by the Examiner may include consideration of the admitted prior art found in the record, such as in an Applicants' Specification. *Nomiya*, 509 F.2d at 570-571; *Davis*, 305 F.2d at 503; *Hedges*, 783 F.2d at 1039-1040.

combined teachings of the applied references and aware of the admitted prior art, would have been led to add the two passivating agents (aluminum passivating agent and vanadium passivating agent) in the claimed order, as one of the few available options for supplying the two known passivation agents to reduce and/or remove unwanted vanadium and aluminum impurities.

As for the separate arguments presented by Appellants with respect to dependent claims 14 and 19, we are not persuaded of error in the Examiner's obviousness rejections of these claims by the additional arguments presented that pertain thereto for the reasons set forth above and in the Examiner's Answer (Ans. 15-16).

Consequently, we agree with the Examiner's obviousness holding that the applied prior art combinations do teach or suggest that a titanium oxychloride detection step (and follow up aluminum chloride passivation step depending thereon) would have been an obvious passivation and detection treatment that one of ordinary skill in the art would have recognized as being applicable to a discharge stream of a titanium tetrachloride chlorinator that was subjected to at least some vanadium passivation, with or without aluminum passivation agent addition, to rid the desired titanium tetrachloride stream of unwanted vanadium chlorides and active aluminum chlorides.

CONCLUSION

Appellants have not identified reversible error in the Examiner's obviousness rejections by asserting that the step of conducting detection for titanium oxychloride in a discharge stream from a titanium tetrachloride chlorinator wherein at least some vanadium chloride passivation has occurred, and with aluminum chloride passivation agent added when titanium oxychloride is not detected, is not taught or suggested to one of ordinary skill in the art by: (1) the combined teachings of the admitted prior art or GB '074 taken with Cronin and/or (2) the combined teachings of Kay, Frey, and Cronin.

ORDER

The Examiner's decision to reject claims 12-19 under 35 U.S.C. § 103(a) as being unpatentable over admitted prior art or GB '074, each in view of Cronin; and to reject claims 12-19 under 35 U.S.C. § 103(a) as being unpatentable over Kay in view of Frey and Cronin is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(v).

AFFIRMED

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